

AMENDMENTS TO THE CLAIMS

Listing of the claims:

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

1. (Currently Amended) An image sensor for capturing images, comprising:
 - a pixel array where pixels having photoelectric conversion elements are arranged in a matrix;
 - a plurality of row select lines which are arranged in a row direction in said pixel array;
 - a plurality of column lines which are arranged in a column direction in said pixel array;
 - a sample hold circuit disposed in each one of said column lines;
 - a vertical scan circuit for generating vertical scan signals to sequentially select said plurality of row select lines; and
 - a horizontal scan circuit for generating horizontal scan signal to sequentially select an output of said sample hold circuit, wherein said vertical scan circuit sequentially selects and scans said plurality of row select lines within a first vertical scan period when said image sensor is controlled to a first frame period, and also sequentially selects and scans said plurality of row select lines within said first vertical scan period even when said image sensor is controlled to a second frame period, which is longer than said first frame period, said first and second frame periods being a period between adjacent selections of a firstly selected row selection line, said second frame period being longer than said first vertical scan period, and

wherein an integration period of the plurality of rows of pixels is shifted with respect to each other.

2. (Original) The image sensor according to claim 1, wherein said horizontal scan circuit generates said horizontal scan signals while said vertical scan circuit selects each one of said row select lines, and said horizontal scan circuit does not generate said horizontal scan signals when said vertical scan circuit does not generate said vertical scan signals.

3. (Original) The image sensor according to claim 1, wherein said pixel comprises a photoelectric conversion element, a reset transistor, a source follower transistor, and a selecting transistor which is controlled by said row select lines.

4. (Original) The image sensor according to claim 1, wherein said first vertical scan period is a period which is a part of said first frame period.

5. (Currently Amended) An image sensor for capturing images, comprising:
a pixel array where pixels having photoelectric conversion elements are arranged in a matrix;

a plurality of row select lines which are arranged in a row direction in said pixel array;

a plurality of column lines which are arranged in a column direction in said pixel array;

a sample hold circuit disposed in each one of said column lines for sample holding photoelectric conversion signals of said pixels;

a vertical scan circuit for generating vertical scan signals to sequentially select said plurality of row select lines; and

a horizontal scan circuit for generating horizontal scan signal to sequentially select an output of said sample hold circuit, wherein said vertical scan circuit sequentially selects and scans said plurality of row select lines within a first vertical scan period when said image sensor is controlled to a first frame period, and also sequentially selects and scans said plurality of row select lines within said first vertical scan period even when said image sensor is controlled to a second frame period, which is longer than said first frame period, said first and second frame periods being a period between adjacent selections of a firstly selected row selection line, said second frame period being longer than said first vertical scan period, and

wherein an integration period of the plurality of rows of pixels is shifted with respect to each other.

6. (Original) The image sensor according to claim 5, wherein said vertical scan circuit does not output said vertical scan signals after said first vertical scan period in said frame period has elapsed.

7. (Currently Amended) An image sensor for capturing images, comprising:
a pixel array where pixels having photoelectric conversion elements are arranged in a matrix;
a plurality of row select lines which are arranged in a row direction in said pixel array;

a plurality of column lines which are arranged in a column direction in said pixel array;

a sample hold circuit disposed in each one of said column lines for sample holding photoelectric conversion signals of said pixels;

a vertical scan circuit for generating vertical scan signals to sequentially select said plurality of row select lines; and

a horizontal scan circuit for generating horizontal scan signals to sequentially select the output of said sample hold circuit while each one of said row select lines is selected,

wherein said vertical scan circuit sequentially selects and scans said plurality of row select lines within the vertical scan period which is a part of the frame period, and does not select said row select line outside said vertical scan period in said frame period, said frame period being a period between adjacent selections of a firstly selected row selection line, said frame period being longer than said vertical scan period, and

wherein an integration period of the plurality of rows of pixels is shifted with respect to each other.

8. (Original) The image sensor according to one of claims 1, 5 and 7, further comprising:

a line buffer for storing one row of output of said sample hold circuit; and an image processor for inputting an output of said line buffer, wherein in the horizontal scan period, an output signal of said sample hold circuit is stored in said line buffer responding to said horizontal scan signal, and said output signal in said line buffer is output to said image processor responding to an output clock with a cycle longer than said horizontal scan signal.

9. (Canceled)